

# PMP5501V; PMP5501G; PMP5501Y

PNP/PNP matched double transistors

Rev. 02 — 19 September 2006

Product data sheet

## 1. Product profile

### 1.1 General description

PNP/PNP matched double transistors in small Surface-Mounted Device (SMD) plastic packages. The transistors in the SOT666 and SOT363 (SC-88) packages are fully isolated internally.

Table 1. Product overview

Type number	Package		PNP/PNP $h_{FE1}/h_{FE2}$ 0.98 complement	NPN/NPN complement
	Philips	JEITA		
PMP5501V	SOT666	-	PMP5201V	PMP4501V
PMP5501G	SOT353	SC-88A	PMP5201G	PMP4501G
PMP5501Y	SOT363	SC-88	PMP5201Y	PMP4501Y

### 1.2 Features

- Current gain matching
- Base-emitter voltage matching
- Common emitter configuration for SOT353 types
- Application-optimized pinout

### 1.3 Applications

- Current mirror
- Differential amplifier

### 1.4 Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
$V_{CEO}$	collector-emitter voltage	open base	-	-	-45	V
$I_C$	collector current		-	-	-100	mA
$h_{FE}$	DC current gain	$V_{CE} = -5$ V; $I_C = -2$ mA	200	290	450	

**Table 2. Quick reference data ...continued**

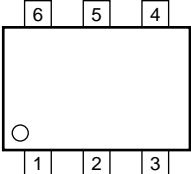
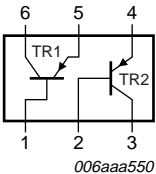
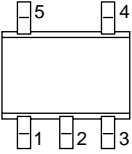
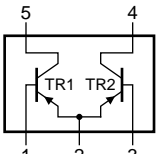
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per device</b>						
$h_{FE1}/h_{FE2}$	$h_{FE}$ matching	$V_{CE} = -5\text{ V};$ $I_C = -2\text{ mA}$	[1] 0.95	1	-	
$V_{BE1}-V_{BE2}$	$V_{BE}$ matching	$V_{CE} = -5\text{ V};$ $I_C = -2\text{ mA}$	[2] -	-	2	mV

[1] The smaller of the two values is taken as the numerator.

[2] The smaller of the two values is subtracted from the larger value.

## 2. Pinning information

**Table 3. Pinning**

Pin	Description	Simplified outline	Symbol
<b>SOT666; SOT363</b>			
1	base TR1		
2	base TR2		
3	collector TR2		
4	emitter TR2		
5	emitter TR1		
6	collector TR1		
<b>SOT353</b>			
1	base TR1		
2	emitter TR1, TR2		
3	base TR2		
4	collector TR2		
5	collector TR1		

## 3. Ordering information

**Table 4. Ordering information**

Type number	Package		Version
	Name	Description	
PMP5501V	-	plastic surface-mounted package; 6 leads	SOT666
PMP5501G	SC-88A	plastic surface-mounted package; 5 leads	SOT353
PMP5501Y	SC-88	plastic surface-mounted package; 6 leads	SOT363

## 4. Marking

**Table 5. Marking codes**

Type number	Marking code <sup>[1]</sup>
PMP5501V	ED
PMP5501G	R4*
PMP5501Y	S6*

- [1] \* = -: made in Hong Kong  
 \* = p: made in Hong Kong  
 \* = t: made in Malaysia  
 \* = W: made in China

## 5. Limiting values

**Table 6. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
<b>Per transistor</b>					
$V_{CBO}$	collector-base voltage	open emitter	-	-50	V
$V_{CEO}$	collector-emitter voltage	open base	-	-45	V
$V_{EBO}$	emitter-base voltage	open collector	-	-5	V
$I_C$	collector current		-	-100	mA
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	-200	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C			
	SOT666		<sup>[1][2]</sup> -	200	mW
	SOT353		<sup>[1]</sup> -	200	mW
	SOT363		<sup>[1]</sup> -	200	mW
<b>Per device</b>					
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C			
	SOT666		<sup>[1][2]</sup> -	300	mW
	SOT353		<sup>[1]</sup> -	300	mW
	SOT363		<sup>[1]</sup> -	300	mW
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-65	+150	°C
$T_{stg}$	storage temperature		-65	+150	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Reflow soldering is the only recommended soldering method.

## 6. Thermal characteristics

**Table 7. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
<b>Per transistor</b>							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air					
	SOT666		[1][2]	-	-	625	K/W
	SOT353		[1]	-	-	625	K/W
SOT363		[1]	-	-	625	K/W	
<b>Per device</b>							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air					
	SOT666		[1][2]	-	-	416	K/W
	SOT353		[1]	-	-	416	K/W
SOT363		[1]	-	-	416	K/W	

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Reflow soldering is the only recommended soldering method.

## 7. Characteristics

**Table 8. Characteristics**

$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -30\text{ V};$ $I_E = 0\text{ A}$	-	-	-15	nA
		$V_{CB} = -30\text{ V};$ $I_E = 0\text{ A};$ $T_j = 150\text{ }^{\circ}\text{C}$	-	-	-5	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\text{ V};$ $I_C = 0\text{ A}$	-	-	-100	nA
$h_{FE}$	DC current gain	$V_{CE} = -5\text{ V};$ $I_C = -10\text{ }\mu\text{A}$	-	250	-	
		$V_{CE} = -5\text{ V};$ $I_C = -2\text{ mA}$	200	290	450	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -10\text{ mA};$ $I_B = -0.5\text{ mA}$	-	-50	-200	mV
		$I_C = -100\text{ mA};$ $I_B = -5\text{ mA}$	-	-200	-400	mV
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -10\text{ mA};$ $I_B = -0.5\text{ mA}$	[1]	-	-760	mV
		$I_C = -100\text{ mA};$ $I_B = -5\text{ mA}$	[1]	-	-920	mV

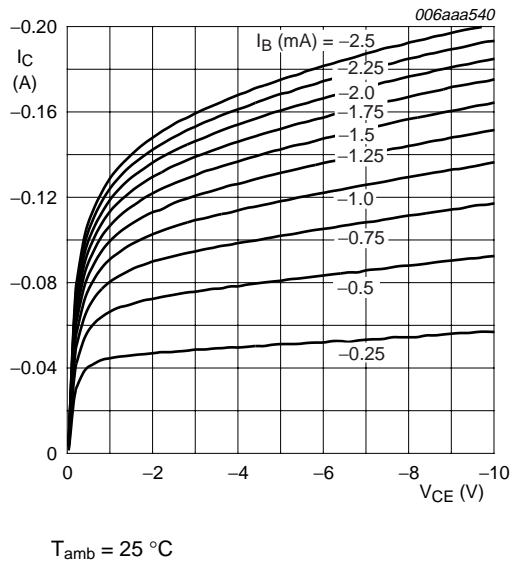
**Table 8. Characteristics ...continued** $T_{amb} = 25^\circ\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{BE}$	base-emitter voltage	$V_{CE} = -5\text{ V};$ $I_C = -2\text{ mA}$	[2] -600	-650	-700	mV
		$V_{CE} = -5\text{ V};$ $I_C = -10\text{ mA}$	[2] -	-	-760	mV
$C_c$	collector capacitance	$V_{CB} = -10\text{ V};$ $I_E = i_e = 0\text{ A};$ $f = 1\text{ MHz}$	-	-	2.2	pF
$C_e$	emitter capacitance	$V_{EB} = -0.5\text{ V};$ $I_C = i_c = 0\text{ A};$ $f = 1\text{ MHz}$	-	10	-	pF
$f_T$	transition frequency	$V_{CE} = -5\text{ V};$ $I_C = -10\text{ mA};$ $f = 100\text{ MHz}$	100	175	-	MHz
NF	noise figure	$V_{CE} = -5\text{ V};$ $I_C = -0.2\text{ mA};$ $R_S = 2\text{ k}\Omega;$ $f = 10\text{ Hz to}$ $15.7\text{ kHz}$	-	1.6	-	dB
		$V_{CE} = -5\text{ V};$ $I_C = -0.2\text{ mA};$ $R_S = 2\text{ k}\Omega;$ $f = 1\text{ kHz};$ $B = 200\text{ Hz}$	-	3.1	-	dB
<b>Per device</b>						
$h_{FE1}/h_{FE2}$	$h_{FE}$ matching	$V_{CE} = -5\text{ V};$ $I_C = -2\text{ mA}$	[3] 0.95	1	-	
$V_{BE1}-V_{BE2}$	$V_{BE}$ matching	$V_{CE} = -5\text{ V};$ $I_C = -2\text{ mA}$	[4] -	-	2	mV

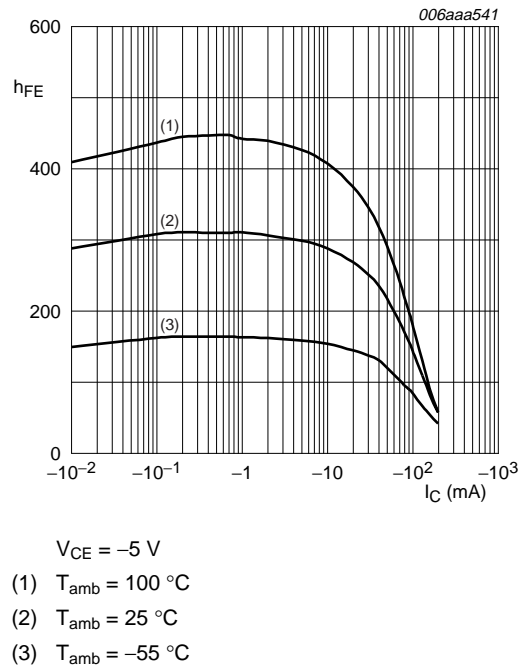
[1]  $V_{BEsat}$  decreases by about 1.7 mV/K with increasing temperature.[2]  $V_{BE}$  decreases by about 2 mV/K with increasing temperature.

[3] The smaller of the two values is taken as the numerator.

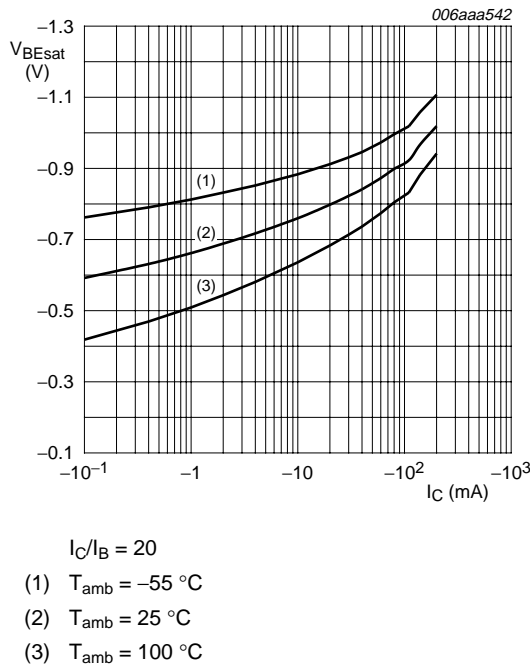
[4] The smaller of the two values is subtracted from the larger value.



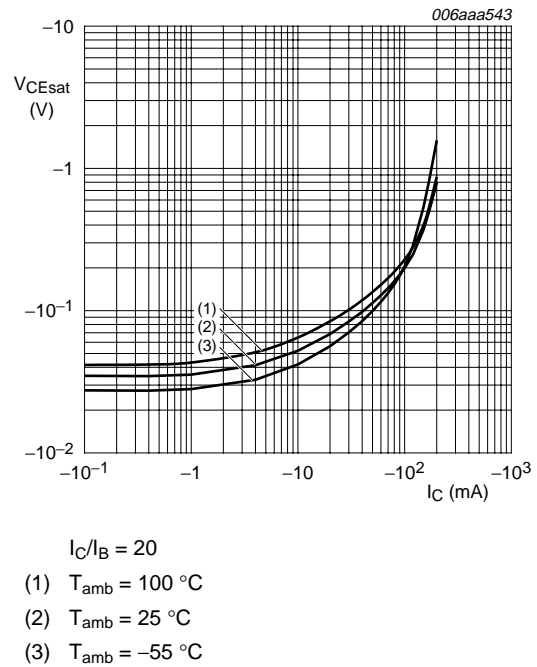
**Fig 1. Collector current as a function of collector-emitter voltage; typical values**



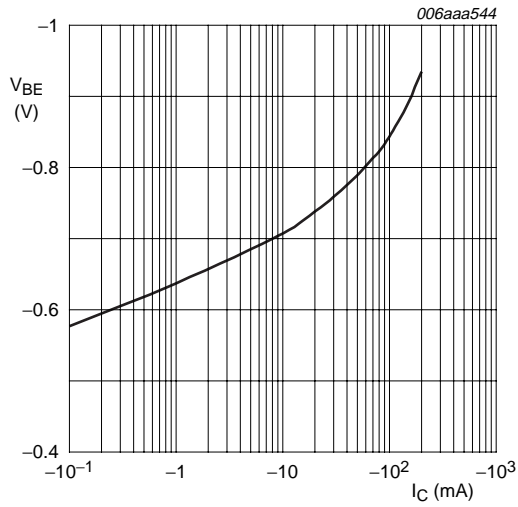
**Fig 2. DC current gain as a function of collector current; typical values**



**Fig 3. Base-emitter saturation voltage as a function of collector current; typical values**

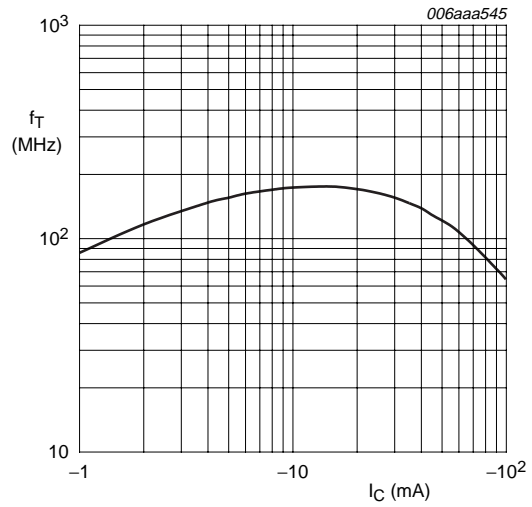


**Fig 4. Collector-emitter saturation voltage as a function of collector current; typical values**



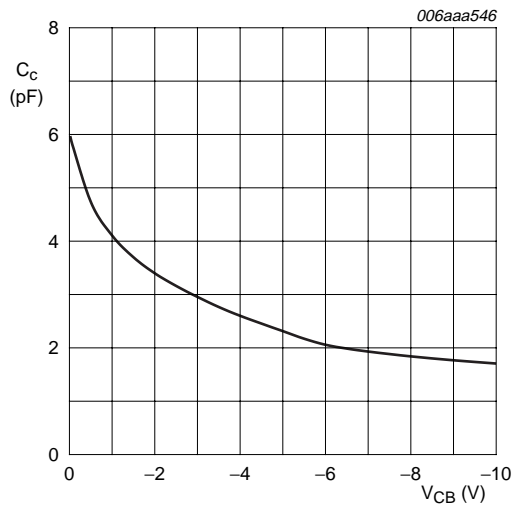
$V_{CE} = -5\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}$

**Fig 5. Base-emitter voltage as a function of collector current; typical values**



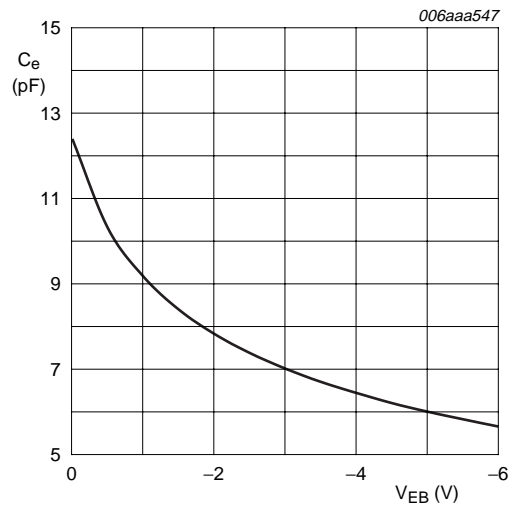
$V_{CE} = -5\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}$

**Fig 6. Transition frequency as a function of collector current; typical values**



$f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$

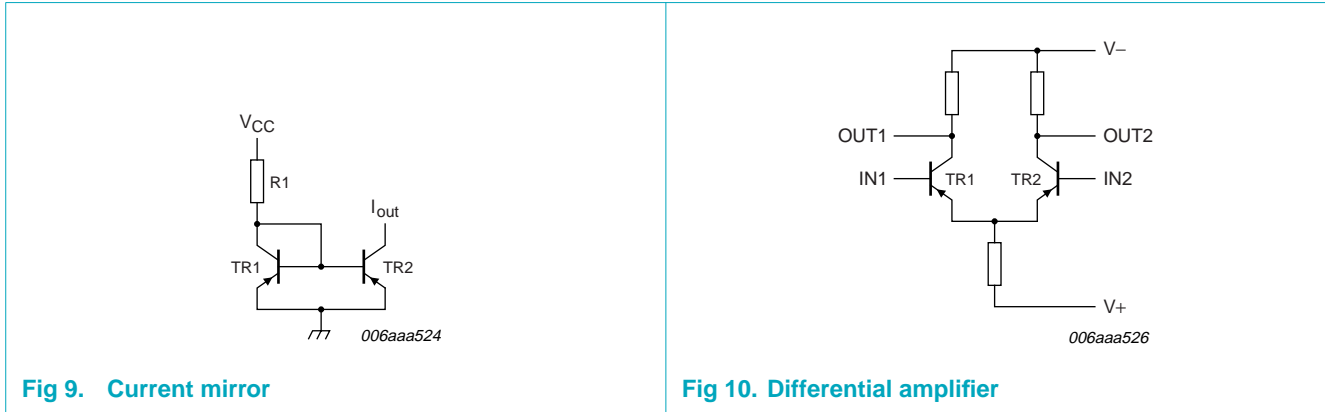
**Fig 7. Collector capacitance as a function of collector-base voltage; typical values**



$f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$

**Fig 8. Emitter capacitance as a function of emitter-base voltage; typical values**

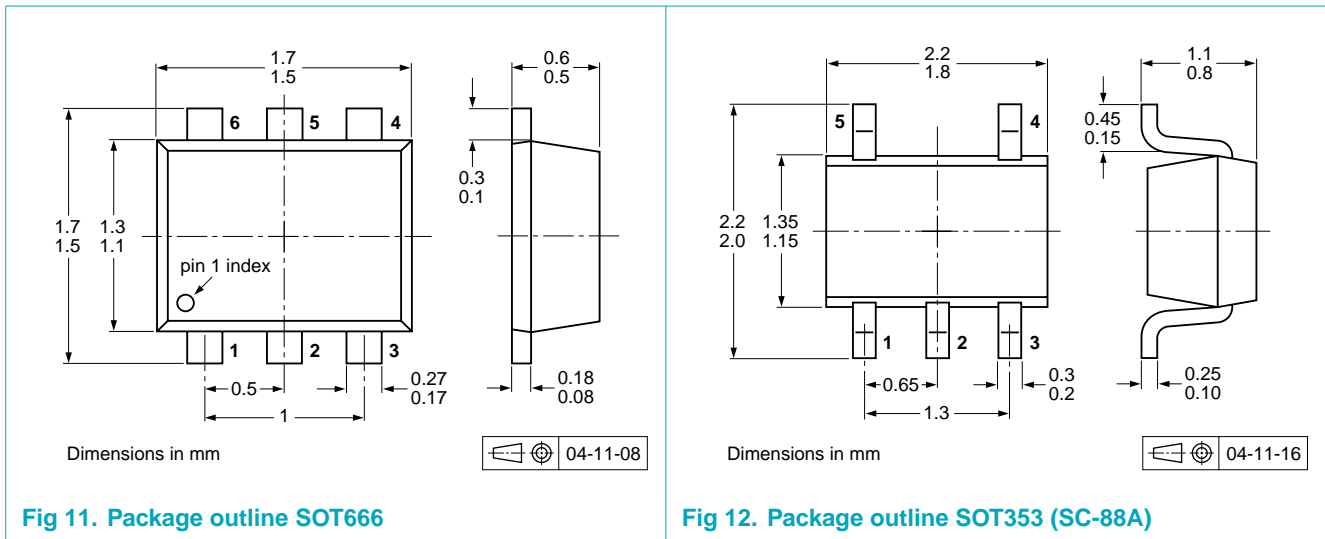
**8. Application information**



**Fig 9. Current mirror**

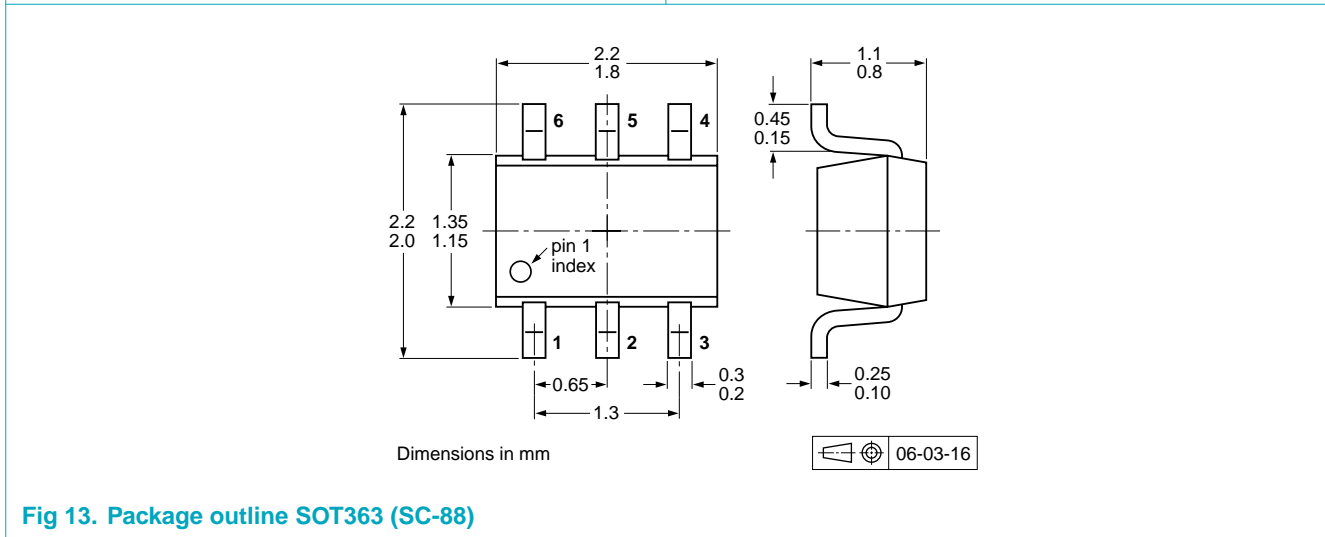
**Fig 10. Differential amplifier**

**9. Package outline**



**Fig 11. Package outline SOT666**

**Fig 12. Package outline SOT353 (SC-88A)**



**Fig 13. Package outline SOT363 (SC-88)**



## 10. Packing information

**Table 9. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

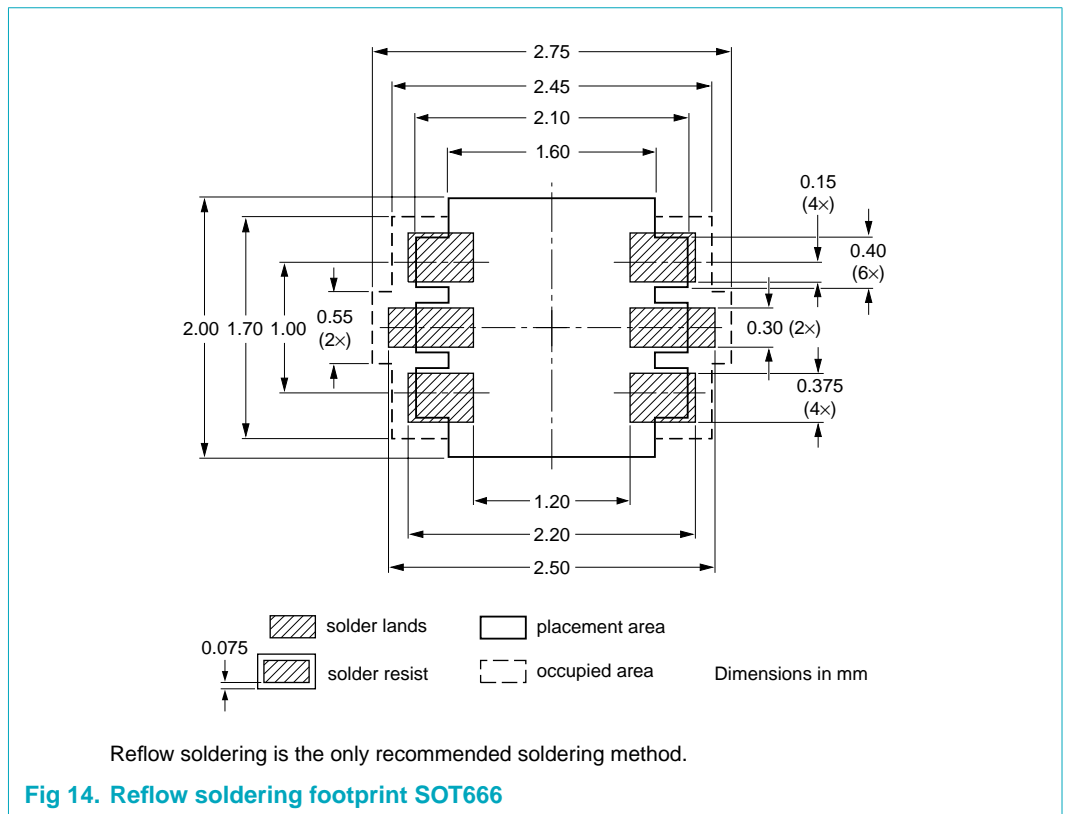
Type number	Package	Description	Packing quantity			
			3000	4000	8000	10000
PMP5501V	SOT666	2 mm pitch, 8 mm tape and reel	-	-	-315	-
		4 mm pitch, 8 mm tape and reel	-	-115	-	-
PMP5501G	SOT353	4 mm pitch, 8 mm tape and reel	-115	-	-	-135
PMP5501Y	SOT363	4 mm pitch, 8 mm tape and reel; T1 <sup>[2]</sup>	-115	-	-	-135
		4 mm pitch, 8 mm tape and reel; T2 <sup>[3]</sup>	-125	-	-	-165

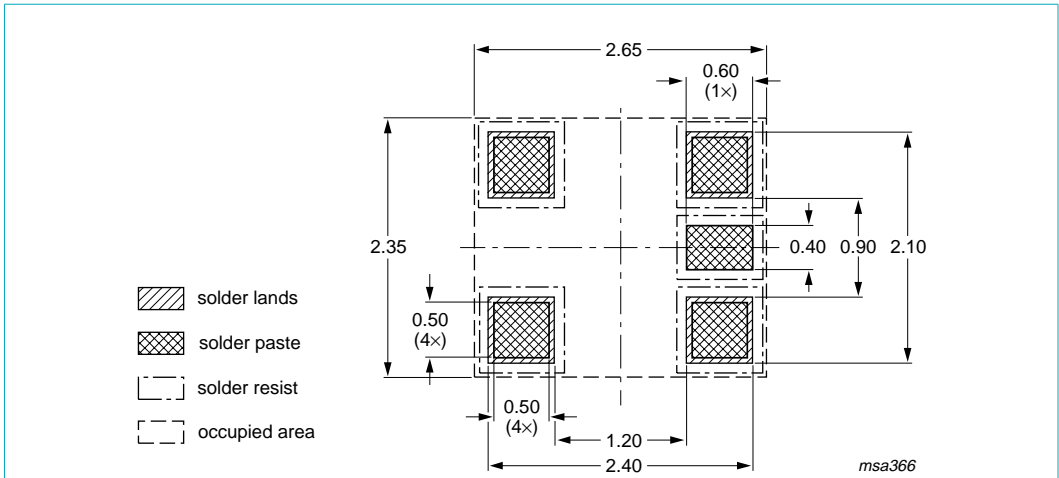
[1] For further information and the availability of packing methods, see [Section 14](#).

[2] T1: normal taping

[3] T2: reverse taping

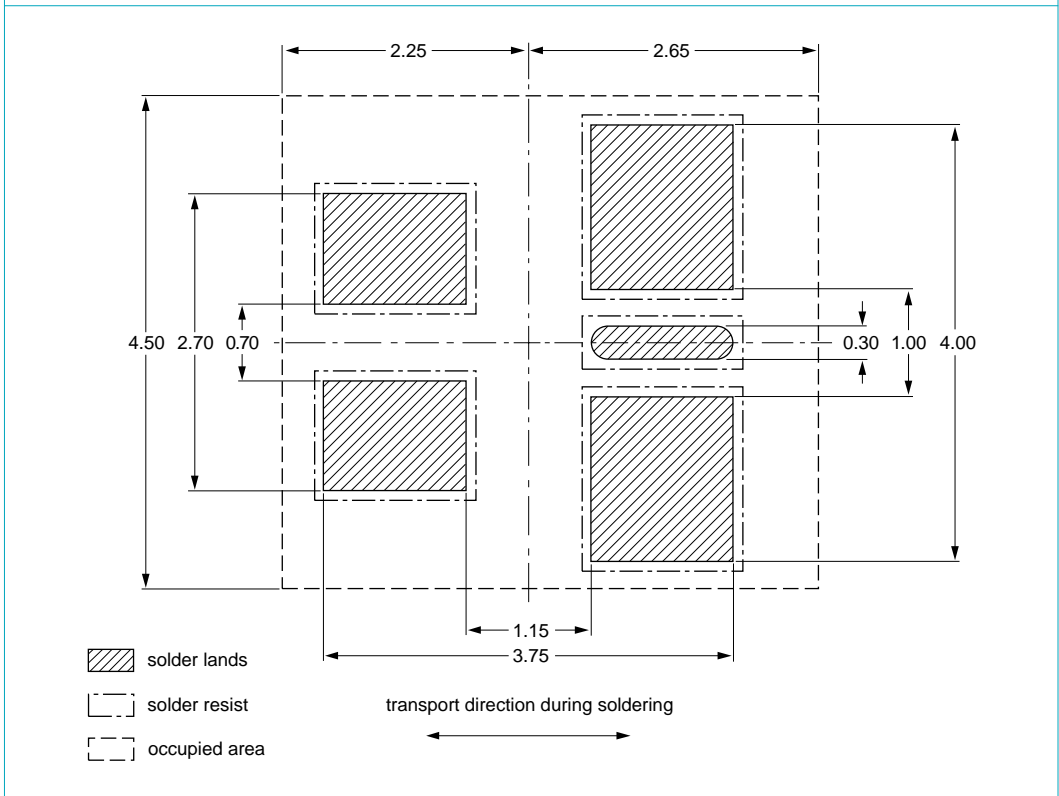
## 11. Soldering





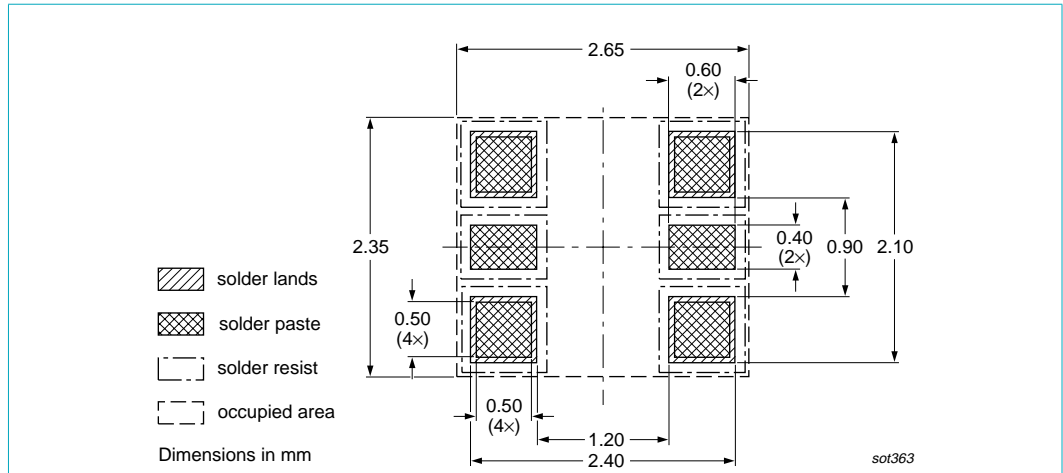
Dimensions in mm

**Fig 15. Reflow soldering footprint SOT353 (SC-88A)**

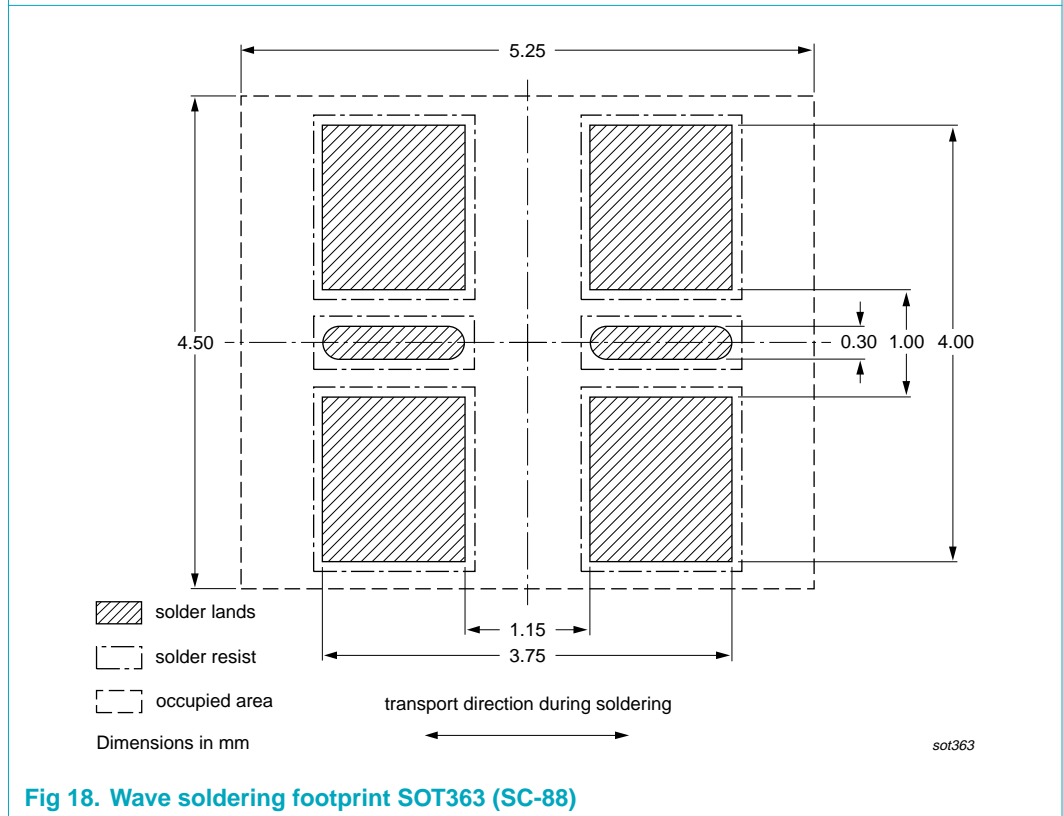


Dimensions in mm

**Fig 16. Wave soldering footprint SOT353 (SC-88A)**



**Fig 17. Reflow soldering footprint SOT363 (SC-88)**



**Fig 18. Wave soldering footprint SOT363 (SC-88)**

## 12. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMP5501V_G_Y_2	20060919	Product data sheet	-	PMP5501G_Y_1
Modifications:	<ul style="list-style-type: none"><li>Type number PMP5501V added</li><li><a href="#">Section 13 "Legal information"</a>: updated</li></ul>			
PMP5501G_Y_1	20060221	Product data sheet	-	-

## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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